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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/001,305	11/30/2001	Stefan Hau-Riege	042390.P12075	2401

7590 12/09/2003
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EXAMINER

HARRISON, MONICA D

ART UNIT PAPER NUMBER

2829

DATE MAILED: 12/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/001,305	HAU-RIEGE ET AL.	
	Examiner	Art Unit	
	Monica D. Harrison	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/30/01 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____. | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "205". A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. The term "near" in claims 3 and 4 is a relative term which renders the claim indefinite. The term "near" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 5, 7, 16, and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Rissman et al (6,566,262 B1).

3. Regarding claim 1, Rissman et al discloses a method of making a semiconductor device comprising: forming a conductive layer (Figure 2, reference 204) that contacts a via

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(Figure 2, reference 202), wherein the conductive layer includes a higher concentration of an electromigration retarding amount of dopant near the via than away from the via (column 1, lines 16-30).

4. Regarding claim 2, Rissman et al discloses wherein the dopant is selected from the group consisting of aluminum, cadmium, tin, and zirconium (column 5, lines 63-67 thru column 6, lines 1-9).

5. Regarding claim 5, Rissman et al discloses a method of making a semiconductor device comprising: forming on a substrate (Figure 2) a via (Figure 2, reference 202) and a conductive layer (Figure 2, reference 204) that contacts the via; introducing into the conductive layer near the via an electromigration retarding amount of a dopant to cause the conductive layer to have a higher concentration of dopant near the via than away from the via (column 1, lines 16-30).

6. Regarding claim 7, Rissman et al discloses wherein the conductive layer is formed prior to forming the via and the via is formed on top of the conductive layer (Figure 2, reference 202).

7. Regarding claim 16, Rissman et al discloses a method of making a semiconductor device comprising: forming a conductive layer on a substrate (Figure 2, reference 204); forming a dielectric layer on the conductive layer (Figure 2, reference 201); etching a via through the dielectric layer, the via being located above a portion of the conductive layer (Figure 2, reference 202); and introducing a dopant into the first portion of the conductive layer (Figure 2, reference 203).

8. Regarding claim 21, Rissman et al discloses a method of making a semiconductor device comprising: forming a dielectric layer on a substrate (Figure 3, reference 201); etching a via through the dielectric layer and a trench into the dielectric layer (Figure 3, reference 202); filling the via and trench with a conductive layer (Figure 3, reference 207); exposing a portion of the conductive layer that lies above the via and introducing a dopant into the exposed portion of the conductive layer (Figure 3, reference 206).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6, 8-15, 17-20, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rissman et al (6,566,262 B1) in view of Stumborg et al (6,077,775).

9. Rissman et al discloses all claimed subject matter except the via being formed prior to forming the conductive layer and the conductive layer is formed on top of the via (claim 6), exposing a portion of the conductive layer where it covers the via, bringing the dopant in contact with the exposed portion of the conductive layer; and applying heat to cause the dopant to diffuse into the conductive layer (claim 8), depositing a dopant containing layer onto that exposed portion (claims 9, 13, 18 and 22), ion implanting the dopant into that exposed portion (claims 10, 14, 19 and 23), subjecting the exposed portion to a gas that contains the dopant (claims 11, 15, 20 and 24), bringing the dopant in contact with the portion of the conductive

layer that lies beneath the via; then applying heat to cause the dopant to diffuse into the conductive layer (claim 12), and forming a barrier layer (claim 17).

Stumborg et al discloses the via being formed prior to forming the conductive layer and the conductive layer is formed on top of the via (Figure 8; column 12, lines 36-43), exposing a portion of the conductive layer where it covers the via, bringing the dopant in contact with the exposed portion of the conductive layer; and applying heat to cause the dopant to diffuse into the conductive layer (Figure 8, reference 47), depositing a dopant containing layer onto that exposed portion (column 13, lines 23-41), ion implanting the dopant into that exposed portion (column 7, lines 14-45), subjecting the exposed portion to a gas that contains the dopant (column 7, lines 46-64), bringing the dopant in contact with the portion of the conductive layer that lies beneath the via; then applying heat to cause the dopant to diffuse into the conductive layer (column 6, lines 12-53), and forming a barrier layer (Figure 8, reference 47).

Since Rissman et al and Stumborg et al are both from the same field of endeavor, the purpose disclosed by Stumborg et al would have been recognized in the pertinent art of Rissman et al.

It is obvious at the time the invention was made to a person having ordinary skill in the art to modify Rissman et al with the teachings of Stumborg et al for the purpose of making a semiconductor device having a barrier film in order to improve performance of integrated circuits.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica D. Harrison whose telephone number is 571-272-1959.


The examiner can normally be reached on M-F 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 571-272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-306-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1782.

Monica D. Harrison
AU 2829

Mdh
November 24, 2003


EVAN PERT
PRIMARY EXAMINER